Luisma, a New Genus of Grammitidaceae (Pteridophyta) from Colombia

M. T. Murillo
Instituto de Ciencias Naturales, Herbario Nacional Colombiano, Universidad Nacional de Colombia, Apartado 7495, Bogotá D.C., Colombia. mariateresamurillo@yahoo.com.mx

Alan R. Smith
University Herbarium, 1001 Valley Life Sciences Bldg. #2465, University of California, Berkeley, California, 94720-2465, U.S.A. arsmith@uclink4.berkeley.edu

Abstract. We describe and illustrate a monotypic new genus and species of fern, *Luisma bivasculare* M. T. Murillo & A. R. Smith (Grammitidaceae), endemic from the Colombian Andes. *Luisma* is similar to narrow-leaved species of *Campyloneurum* (Polypodiaceae). However, it agrees with grammitid ferns in having green, trilete spores (vs. hyaline or yellowish, monolete spores in nearly all Polypodiaceae) and free veins (vs. anastomosing in *Campyloneurum*). From all Grammitidaceae, *Luisma* differs in having two petiolar bundles. Other distinguishing characters include suberect, radially symmetrical rhizomes, sparse hyaline stipe hairs, adaxial hydathodes, and clathrate, setulose rhizome scales.

Resumen. Nosotros describimos e ilustramos un nuevo género y especie de helecho monotípico, *Luisma bivascularis* M. T. Murillo & A. R. Smith (Grammitidaceae), endémico de los Andes colombianos. *Luisma* es similar a especies de *Campyloneurum* (Polypodiaceae) con hojas angostas. Sin embargo, concuerda con las gramitidáceas por tener esporas verdes, triletes (vs. esporas hialinas o amarillentas en casi todas las Polypodiaceae) y venas libres (vs. anastomosadas en *Campyloneurum*). De todas las Grammitidaceae *Luisma* difiere por tener dos haces peciolares. Otros caracteres que lo distinguen incluyen un rizoma radialmente simétrico, con pelos hialinos esparcidos en el estípite, hidatodos adaxiales y escamas del rizoma clatradas, setulosas.

Key words: Colombia, Grammitidaceae, *Luisma*.

In this paper we describe a new genus of Grammitidaceae in Colombia. A number of recent papers establish a generic framework for the family in the Neotropics. These include revisions or synoptical treatments of *Ceradenia* (Bishop, 1988), *Cochlidium* (Bishop, 1978), *Enterosora* (Bishop & Smith, 1992), *Grammitis* sensu stricto (Bishop, 1977), *Lellingeria* (Smith et al., 1991), *Melpomene* (Smith & Moran, 1992), *Micropolypodium* (Smith, 1992), *Terpsichore* (Smith, 1993), and *Zygophlebia* (Bishop, 1989). Prior to these studies, Copeland (1952a, 1952b, 1955) dealt with various elements of Neotropical Grammitidaceae in a synoptical way, and Morton (1967) and Smith and Moran (in Moran & Riba, 1995) treated grammitids from adjacent Ecuador and from Mesoamerica, respectively.

Discovery of a new genus of ferns, based solely on previously undescribed species, is an uncommon event, notwithstanding several exciting discoveries in the last two years. Sun et al. (2001) recently described a new genus and species (*Mankyua chejuense* B.-Y. Sun et al.) of the eusporangiate fern family Ophioglossaceae from Cheju Island, Korea. Even more recently, *Caobangia squamata* (Polypodiaceae) has been described as a new genus and species from Vietnam (Smith & Zhang, 2002). In the Neotropics, the last such monotype named was *Nephopteris maxonii* Lellinger (1966), a poorly known plant (still known only from the type) from Colombia, a country generally acknowledged to be among the richest for ferns (as well as vascular plants) in the Neotropics, and also among the richest in the world (Cuatrecasas, 1958; Gentry, 1982; Moran, 1996; Rangel-Ch., 2000; Hammen, 1995). Below we describe another monotypic genus, *Luisma*, with its sole species *L. bivascularis*. The genus is known only from the type.

Luisma bivascularis M. T. Murillo & A. R. Smith, gen. et sp. nov. TYPE: Colombia. Risaralda: Municipio de Mistrató, entre los corregimientos de Geguadas y Puerto de Oro, selva de pisones, 1550 m, zona de bosque pluvial premontano, bosque primario, 30 mar. 1992, *J. L. Fernández 9613* (holotype, COL 468054). Figure 1.

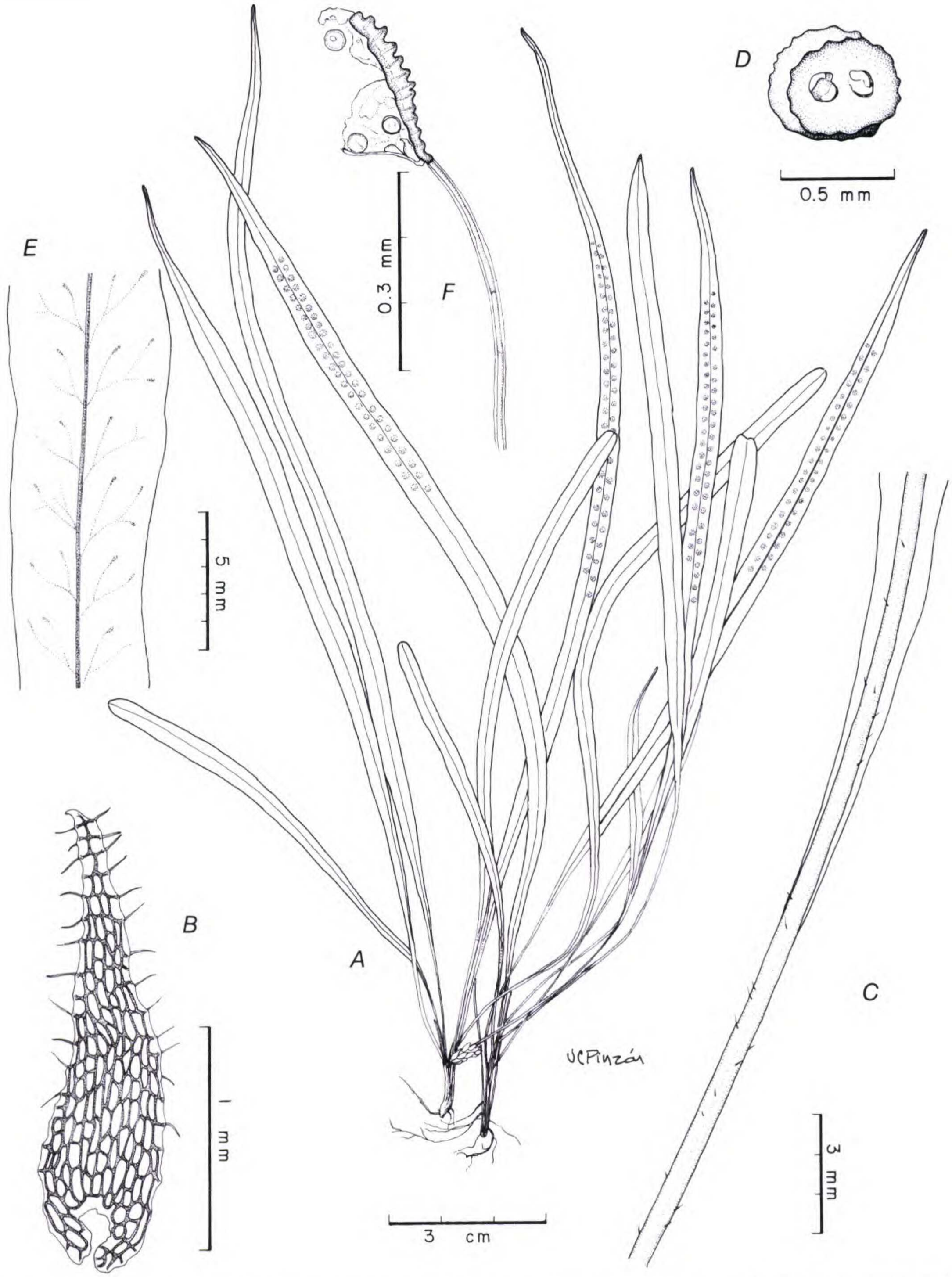

Figure 1. *Luisma bivascularis* M. T. Murillo & A. R. Smith, gen. et sp. nov., based on *J. L. Fernández 9613* (COL). —A. Plant habit. —B. Rhizome scale. —C. Petiole and blade base. —D. Petiole, in cross section, showing two vascular bundles. —E. Venation of a portion of the blade. —F. Sporangium, with spores.

Plantae epiphyticae. Rhizomata radialiter symmetrica, erecta vel suberecta, apice squamata, squamis fumeis, nitentibus, clathratis, usque 2.2 × 0.25 mm, lanceolatis, basi peltatis ad marginem ciliatis, ciliis 0.05 mm longis, hyalinis. Stipites teretes, basi cum duo fascibus vascularibus in sectione transversali, 16–25 × 0.3–0.4 mm, fusci, trichomatibus hyalinis simplibus, phyllopodiis carentibus. Laminae prasinae in statu sicco, anguste ellipticae, 9–20 × 0.3–0.4 cm, membranaceae, basi et apice longiattenuatae, margine integrae; costae venaeque glabrae utrinque; nervi libri, 2–3-furcati; hydathodi adaxialiter prominentes ellipticae. Sori rotundati, ca. 1 mm diam., confinis costae, uniseriales in lateribus ambabus costae, paraphysibus absentibus, capsulis sporangiorum glabris. Sporae virides, globosae, 30–36 μm diam. (in acido lacteo), triletae.

Plants epiphytic. Rhizomes radially symmetrical, erect or suberect, scaly at the apex, scales smoky dark gray, shining, clathrate, up to 2.2 × 0.25 mm, lanceolate, peltate at the base, margins ciliate, cilia 0.05 mm long, hyaline. Stipes terete, darkened (brownish), at the base with two vascular bundles in cross section, 16–25 × 0.3–0.4 mm, trichomes hyaline, simple; phyllopodia absent. Blades greenish in the dried state, narrowly elliptic, 9–20 × 0.3–0.4 cm, membranaceous, at the base and apex long-attenuate, at the margins entire, midribs and veins glabrous on both sides; nerves free, forked; hydathodes adaxially prominent, elliptical. Sori round, ca. 1 mm diam., adjacent to (touching) the midrib, uniseriate on each side of the costa, lacking paraphyses; sporangial capsules glabrous. Spores green, globose, 30–36 μm diam. (in lactic acid), trilete.

Etymology. The genus is dedicated to Luis Maria Murillo (father of the first author), pioneer in entomology in Colombia and author of many scientific works. He was one of the founders in 1929 of the Academia Colombiana de Ciencias Exactas, Físicas y Naturales, and editor of the journal for 10 years (1952–1961). He belonged to the Sociedad Colombiana de Geografía, was an honorary member of the Sociedad Real Entomológica de Bélgica, and founded the Instituto de Altos Estudios del Gobierno Nacional. After more than 40 years of continuous service in the Ministry of Agriculture as "Jefe de Sanidad Vegetal", Colombia's President Alberto Lleras Camargo conferred the Cruz de Boyacá in 1962, in recognition of his outstanding work and exceptional scientific merits. We cite some of his many publications (Murillo, 1937, 1944, 1951, 1956).

The species epithet refers to the petioles, which in cross section have two vascular bundles; this is the only genus known in Grammitidaceae that has this vascular configuration. The implications of this finding for the phylogenetic position of *Luisma* within the Grammitidaceae remain intriguing but unknown, at present.

Habitat and distribution. The type locality is a subandean pluvial forest, where the environment is favorable for the existence of diverse plant life, including numerous epiphytes, ferns, mosses, lichens, aroids, and orchids. In this area there have been found recently several new bird species, in *Vireo* (Salaman & Stiles, 1996) and *Glaucidium* (Robbins & Stiles, 1999); a new lepidopteran insect, *Antirrhea* (Andrade, 1993); a new tree species in the genus *Matisia*, Bombacaceae (Fernández-Alonso, 2001); and a new *Columnea*, Gesneriaceae (Amaya-Márquez, 2002).

The species is known from only a single collection, and is seemingly rare. However, the locality is relatively inaccessible, and the great floristic diversity of the region, as well as the paucity of collections from the area, may obscure the fact that it could be locally common. More likely, it is of very restricted occurrence.

At first glance, *Luisma bivascularis* looks like a species of *Campyloneurum* (Polypodiaceae), but in studying the characters further, we conclude that it has no close affinity with that genus. Clearly, the species is a member of the Grammitidaceae because of its chlorophyllous (green) trilete spores and free veins (although a few Polypodiaceae sensu stricto also have free veins, e.g., some species of *Polypodium* and also *Pecluma*, and a few grammitids have anastomosing veins, e.g., *Zygophlebia*). Also the rhizome scales, which are strongly clathrate and with hyaline marginal setulae, are reminiscent of *Lellingeria* (Grammitidaceae) and unlike anything known in Polypodiaceae. The rhizomes appear to be radially symmetrical and suberect, like some grammitid ferns but unlike almost all Polypodiaceae. We are unable to place the specimen in any known genus of Grammitidaceae in either the Neotropics or Paleotropics. From all known genera and species of Grammitidaceae, *Luisma bivascularis* differs in having two vascular bundles in the petioles. Many species of grammitids have been checked for this character (Parris, 1990; A. R. Smith & B. S. Parris, unpublished data), including some that are larger than *Luisma*. In addition, *Luisma* differs from the largely Neotropical genera *Ceradenia*, *Enterosora*, and *Zygophlebia* in having veins ending in prominent hydathodes adaxially. *Luisma* further differs from *Ceradenia* in having clathrate rhizome scales and from *Zygophlebia* in lacking distinct phyllopodia.

From *Terpsichore*, *Melpomene*, and *Micropolypodium*, other Neotropical grammitid genera, *Luisma* differs in lacking long reddish or red-brown setae

on the blades and petioles; in fact, the fronds of *Luisma* are nearly glabrous or with only sparse whitish hairs on the stipes. *Melpomene* further differs in having entire marginal rhizome scales and pinnatifid to pinnatisect leaves. Like *Micropolypodium* and some species of *Terpsichore*, *Luisma* has hyaline marginal setae on the rhizome scales, but it differs from all species in those genera in having entire leaves. From *Lellingeria*, which has similar rhizome scales, *Luisma* differs in its simple, entire blades, lack of forked hairs on the stipes and rachises, and generally quite glabrous blades.

Other simple-bladed species of Grammitidaceae in the Neotropics include *Cochlidium*, the species of which have dull, concolorous, orange to tan, entire rhizome scales; *Grammitis*, with species having black sclerenchymatous margins and lustrous, concolorous, orange to tan, entire rhizome scales; and *Lomaphlebia* (Greater Antilles), with anastomosing veins and rhizome scales similar to those of *Cochlidium* and *Grammitis*. American species of *Grammitis* sensu stricto lacking a black margin occur in southern South America, but these have orangish, concolorous, entire rhizome scales and are very small-bladed species, generally less than ca. 5 cm long. We do not believe that any American genus of Grammitidaceae is closely related to *Luisma*, nor can we demonstrate that any Old World genus of Grammitidaceae has close relationships. Without molecular data, the closest affinities of *Luisma* will probably remain obscure, and we believe it likely that *Luisma* is one of the most isolated species and genera in the family, phylogenetically.

Artificial Key to Genera of Grammitidaceae in Colombia

1a. Blades entire, deeply serrate, crenate, or broadly and shallowly lobed.
  2a. Petioles each with two vascular bundles; rhizome scales clathrate, with ciliate margins . . . . . *Luisma*
  2b. Petioles each with a single vascular bundle; rhizome scales non-clathrate, entire or at least not ciliate.
    3a. Blade margins sclerified, dark brown or black . . . . . *Grammitis*
    3b. Blade margins not sclerified, greenish or yellowish.
      4a. Rhizomes radially symmetrical; blades entire to deeply serrate, usually less than 5 mm wide; hydathodes evident or not adaxially . . . . . *Cochlidium*
      4b. Rhizomes dorsiventral; blades entire, crenate, or broadly lobed, usually more than 5 mm wide; hydathodes absent adaxially . . . . . *Enterosora*
1b. Blades pinnatifid, pinnatisect, or 1-pinnate.
  5a. Hydathodes absent adaxially.
    6a. Veins free; opaque whitish stalked glands borne in sori and sometimes also on blades . . *Ceradenia*
    6b. Veins areolate; opaque whitish glands lacking in sori and on blades . . . . . *Zygophlebia*
  5b. Hydathodes present adaxially.
    7a. Rhizome scales not clathrate.
      8a. Blades less than 1 cm wide, with one sorus per segment; main veins in segments (pinnae) simple or with a single acroscopic branch; rhizomes radially symmetric . . . . *Micropolypodium*
      8b. Blades usually more than 1 cm wide, with more than one sorus per segment; main veins in segments (pinnae) pinnately branched; rhizomes dorsiventral to radial . . . . . *Terpsichore*
    7b. Rhizome scales usually strongly clathrate.
      9a. Setae lacking on margins of scales, but sometimes with several minute papillae at scale tips . . . . . *Melpomene*
      9b. Setae on margins of scales hyaline to reddish.
        10a. Cell luminae clear; blades lacking black clavate fungal fruiting bodies . . . . . *Lellingeria*
        10b. Cell luminae darkened; blades often with black clavate fungal fruiting bodies, especially along rachises, costae, and among sporangia . . . . . *Terpsichore*

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